

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (amended): A bandpass limiting apparatus in a receiver of the superheterodyne type, in which a plurality of frequency conversions are performed, said apparatus comprising:

a bandpass changing means for controlling an intermediate-frequency circuit having a plurality of frequency converting stages outputting intermediate-frequency signals, said bandpass changing means being operable to and broadening, narrowing, and/or shifting adjust a passband of an analog intermediate-frequency signal obtained from a final stage ~~thereof~~ of said intermediate-frequency circuit;

an A/D conversion means for converting said analog intermediate-frequency signal to a digital signal;

a digital signal processing means for ~~broadening, narrowing, and/or shifting~~ adjusting the passband of said intermediate-frequency signal converted to a digital signal by said A/D conversion means;

a detection means for obtaining an audio signal detected from said digital signal output by said digital signal processing means;

a passband changing means for changing a passband based on an adjustment signal from an adjustment operation part; and

a control means, ~~which, by controlling said digital signal processing means, based responsive to on an~~ said adjustment signal from ~~an~~ said adjustment operation part[[,]] and operable to cause ~~causes~~ said passband of said analog intermediate-frequency signals at each said frequency converting stage to change in concert.

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Claim 2 (amended): A bandpass limiting apparatus in a receiver of the superheterodyne type, in which a plurality of frequency conversions are performed, said apparatus comprising:

a bandpass changing means for controlling an intermediate-frequency circuit with a plurality of frequency converting stages outputting intermediate-frequency signals, said bandpass changing means being operable to ~~and broadening, narrowing, and/or shifting~~ adjust a passband of an analog intermediate-frequency signal obtained from a final stage thereof of said intermediate-frequency circuit;

a frequency conversion means for changing said intermediate-frequency signal to a frequency signal for processing that is suitable for a data processing speed of a digital signal processing means;

an A/D conversion means for converting said intermediate-frequency signal to a digital signal;

a digital signal processing means for ~~broadening, narrowing, and/or shifting the passband of~~ for receiving said intermediate-frequency signal converted to a digital signal by said A/D conversion means and adjusting a passband of said digital signal;

a detection means for obtaining an audio signal detected from said digital signal output by said digital signal processing means; and

a control means, ~~which, by controlling said digital signal processing means, based responsive to an adjustment signal from an adjustment operation part[[,]] and operable to cause~~ causes said passband of said intermediate-frequency signals at each said frequency converting stage to change in concert.

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Claim ³/₃ (amended): A bandpass-limiting apparatus according to claim 1[[,]]

wherein:

said detection means obtains said ~~converts a digital signal obtained from said digital signal processing means to a digital signal corresponding to an audio signal after~~ from said digital signal output; and detection,

~~the converted digital~~ said audio signal is ~~being then D/A converted to an analog~~ audio signal by a D/A converter.

¹⁵
Claim ⁴/₄ (new): The bandpass limiting apparatus according to claim ¹⁴/₂ wherein:

said detection means obtains said audio signal from said digital signal output; and

said audio signal is then converted to an analog audio signal by a D/A converter.

³
Claim ⁵/₅ (new): The bandpass limiting apparatus according to claim 1 wherein:

said bandpass changing means is operable to broaden said passband of said analog intermediate-frequency signal].

⁴
Claim ~~6~~ (new): The bandpass limiting apparatus according to claim 1 wherein:
said bandpass changing means is operable to narrow said passband of said analog
intermediate-frequency signal.

⁵
Claim ~~7~~ (new): The bandpass limiting apparatus according to claim 1 wherein:
said bandpass changing means is operable to shift said passband of said analog
intermediate-frequency signal.

⁶
Claim ~~8~~ (new): The bandpass limiting apparatus according to claim 1 wherein:
said bandpass changing means is operable to broaden and shift said passband of
said analog intermediate-frequency signal.

⁷
Claim ~~9~~ (new): The bandpass limiting apparatus according to claim 1 wherein:
said bandpass changing means is operable to narrow and shift said passband of
said analog intermediate-frequency signal.

⁸
Claim ~~10~~ (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital signal processor is operable to limit a bandwidth of said digital signal
in response to said adjustment signal.

⁹
Claim 11 (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital processing means is operable to broaden said passband of said digital
signal.

¹⁰
Claim 12 (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital processing means is operable to narrow said passband of said digital
signal.

¹¹
Claim 13 (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital processing means is operable to shift said passband of said digital
signal.

¹²
Claim 14 (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital processing means is operable to broaden and shift said passband of
said digital signal.

¹³
Claim 15 (new): The bandpass limiting apparatus according to claim 1 wherein:
said digital processing means is operable to narrow and shift said passband of said
digital signal.

Claim 16 (new): A bandpass limiting apparatus in a superheterodyne receiver in
which a plurality of frequency conversions are performed, said apparatus comprising:

a bandpass changer operable to control an intermediate-frequency circuit and selectively perform at least one of a broadening, narrowing, or shifting operation to a passband of an intermediate-frequency signal obtained from a final stage thereof;

an A/D converter operable to convert said intermediate-frequency signal to a digital signal;

a digital signal processor operable to selectively perform at least one of a broadening, narrowing, or shifting operation to the passband of said intermediate-frequency signal converted to a digital signal by said A/D converter;

a detector operable to obtain an audio signal detected from said digital signal output by said digital signal processor;

a passband changer operable to change a passband of said audio signal based on an adjustment signal from an adjustment operation part; and

a controller responsive to said adjustment signal from said adjustment operation part for selectively controlling said intermediate-frequency circuit to cause said passband of said intermediate-frequency signal at each stage to change in concert.

Claim 17 (new): A bandpass limiting apparatus in a superheterodyne receiver in which a plurality of frequency conversions are performed, said apparatus comprising:

a signal receiver including an antenna for receiving a first signal;

a bandpass changer in electrical communication with said signal receiver and operable to receive said first signal, said bandpass changer operable to transmit said first signal through a plurality of frequency mixers at multiple stages for filtering a passband

of an analog intermediate-frequency signal obtained from providing said first signal to said mixers;

an A/D converter operable to convert said analog intermediate-frequency signal output from said bypass changer to a digital signal;

a digital signal processor operable to modify said passband of said intermediate-frequency signal converted to a digital signal by said A/D converter;

a detector operable to obtain an audio signal detected from said digital signal output by said digital signal processor;

a passband changer operable to change a passband of said audio signal based on an adjustment signal from an adjustment operation part; and

a controller responsive to said adjustment signal from said adjustment operation part for selectively controlling said multiple stages wherein said passband of said analog intermediate-frequency signal may be changed at each said stage in concert.

Claim 18 (new): The bandpass limiting apparatus according to claim 17 wherein:

said bandpass changer includes a first mixer operable to mix said first said signal to produce a first intermediate-frequency signal, a second mixer operable to mix said first intermediate-frequency signal into a second intermediate-frequency signal, and a third mixer operable to mix said second intermediate-frequency signal into a third intermediate-frequency that is passed to said A/D converter.

Claim 19 (new): The bandpass limiting apparatus according to claim 18 further including:

a fourth mixer in said bandpass changer operable to mix said third intermediate-frequency signal into a fourth intermediate-frequency signal to be passed onto said A/D converter.

Claim 20 (new): The bandpass limiting apparatus according to claim 17 wherein: said bandpass changer includes at least three mixers operable to reduce an incoming first signal to a frequency of less than or equal to 455KHz.

Claim 21 (new): The bandpass limiting apparatus according to claim 20 wherein: each of said mixers include an oscillator responsive to said controller.

Claim 22 (new): The bandpass limiting apparatus according to claim 17 wherein: said bypass changer is operable to provide said intermediate-frequency signal directly to said A/D converter.

Claim 23 (new) The bandpass limiting apparatus according to claim 17 wherein: said digital signal processor is operable to directly receive said intermediate-frequency signal.

Claim 24 (new): The bandpass limiting apparatus according to claim 17 wherein:

said detector is operable to obtain said audio signal after digital signal processor converts said intermediate-frequency signal to a digital signal.

Claim 25 (new): The bandpass limiting apparatus according to claim 24 wherein:

said detector is operable to provide said audio signal to a digital to analog converter for converting said audio signal into an analog signal.

Claim 26 (new): A bandpass limiting apparatus in a receiver of the superheterodyne type in which a plurality of frequency conversions are performed, said apparatus comprising:

- an antenna operable to receive a first signal;

- a first amplifier operable to receive and amplify said first signal;

- a first analog filter including a first mixer, a first oscillator, and a first cutoff filter, said first mixer operable to receive to said first signal and a first input from said first oscillator to output a first reduced frequency signal to said first cutoff filter operable to output a first intermediate-frequency signal;

- a second analog filter including a second mixer, a second oscillator, and a second cutoff filter, said second mixer operable to receive to said first intermediate-frequency signal and a second input from said second oscillator to output a second reduced frequency signal to said second cutoff filter operable to output a second intermediate-frequency signal;

a third analog filter including a third mixer, a third oscillator, and a third cutoff filter, said third mixer operable to receive to said second intermediate-frequency signal and a third input from said third oscillator to output a third reduced frequency signal to said third cutoff filter operable to output a third intermediate-frequency signal;

an analog to digital converter operable to receive said third intermediate-frequency signal and convert said third intermediate-frequency signal to a digital signal with an audio signal component;

a digital signal processor operable to receive said digital signal and including a digital filter operable to control a width and shift of a passband for said digital signal;

an audio signal detector operable to extract said audio signal from said digital signal output by said digital signal processor; and

a controller in communication with said oscillators and said digital signal processor and including an adjustment operation part operable to selectively issue an adjustment signal to alter a passband of said intermediate-frequency signals to change in concert and a passband of said digital filter.